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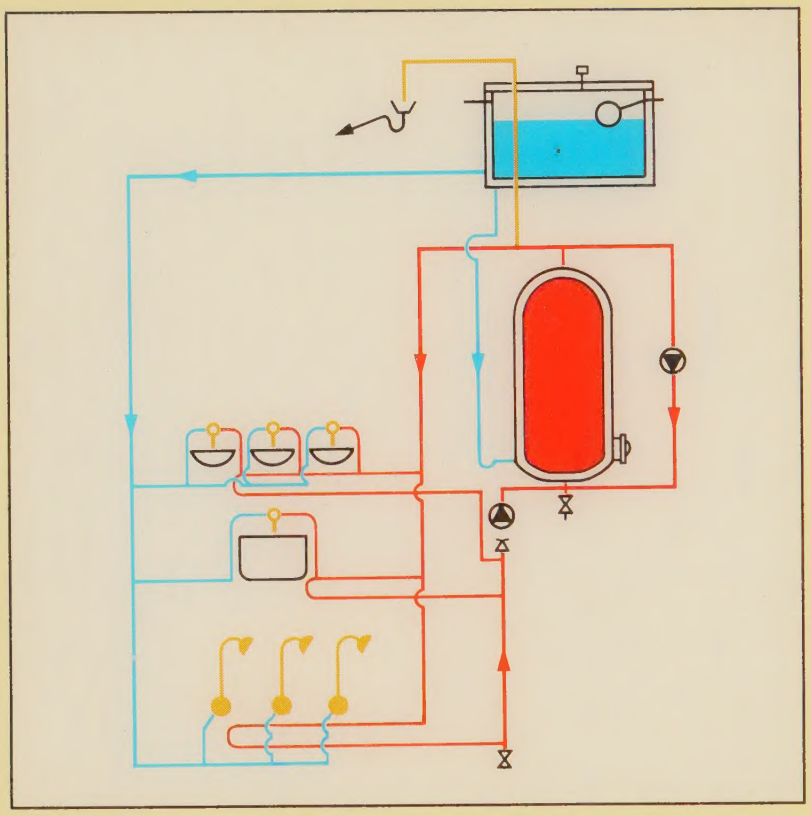
Health Technical Memorandum 2027

Management policy

Hot and cold water supply, storage and mains services



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Health Technical Memorandum 2027

Management policy

Hot and cold water supply, storage and mains services

London : HMSO

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About this publication

Health Technical Memorandum (HTM) 2027 provides recommendations, advice and guidance on the design, installation and maintenance of hot and cold water distribution systems in healthcare premises. It is applicable to new and existing sites, and is for use at various stages during the inception, design, upgrading, refurbishment, extension and maintenance of a building.

HTM 2027 focuses on the:

a. legal and mandatory requirements;

b. design of systems;

c. maintenance of systems;

d. operation of systems.

It is published as four separate volumes, each addressing a specialist discipline:

- this volume – **Management policy** – details overall responsibility of managers of healthcare premises and their legal obligations in setting up and operating a reliable water supply, storage and distribution system. It also summarises the technical aspects involved;

- **Design considerations** – does not set out to give instruction in design work, but highlights the overall requirements and considerations that should be applied to the design up to the contract document;

- **Validation and verification** – details the requirements for ensuring that the supply, storage and distribution system is formally tested and certified as to contract and manufactured to the highest level of quality assurance. The importance of commissioning is emphasised and the minimum of tests on site are listed;

- **Operational management** – provides information for those responsible for overseeing and operating day-to-day running and maintenance. Safe systems of work, record-

keeping and legal obligations are included.

Guidance in this Health Technical Memorandum is complemented by the library of National Health Service Model Engineering Specifications. Users of the guidance are advised to refer to the relevant specifications.

The contents of this Health Technical Memorandum in terms of management policy, operational policy and technical guidance are endorsed by:

a. the Welsh Office for the NHS in Wales;

b. the Health and Personal Social Services Management Executive in Northern Ireland;

c. the National Health Service in Scotland Management Executive;

and they set standards consistent with Departmental Cost Allowance Guides.

This HTM was written with the advice and assistance of experts in the NHS and industry.

References to legislation appearing in the main text of this guidance apply in England and Wales. Where references differ for Scotland and/or Northern Ireland, these are given in marginal notes.

Where appropriate, marginal notes are also used to amplify the text.

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1.0 Introduction

1.1 Health Technical Memorandum 2027 – 'Hot and cold water supply, storage and mains services' is published in four separate parts. It is equally applicable to both new and existing sites and gives comprehensive advice and guidance to healthcare management, design engineers, estate managers and operations managers on the legal requirements, design applications, maintenance and operation of hot and cold water supply, storage and distribution systems in all types of healthcare premises.

1.2 Current statutory legislation requires both "management" and "staff" to be aware of their individual and collective responsibility for the provision of hot and cold water supplies, storage and distribution in healthcare premises.

1.3 Healthcare premises are dependent upon water to maintain a safe and comfortable environment for patients and staff, and for treatment at all levels of clinical and surgical care.

1.4 The development, construction, installation and maintenance of hot and cold water supply systems are vital for public health. Water quality is influenced by political, environmental and technical issues. It is governed by legislation, water byelaws, building regulations, approved codes of practice and technical standards intended to safeguard quality.

1.5 Interruptions in water supply can disrupt healthcare activities. The design of systems must ensure that sufficient reserve water storage is available to minimise the consequence of disruption, while at the same time ensuring an adequate turnover of water to prevent stagnation in storage vessels.

1.6 Many changes in application, design and statutory requirements have occurred since the previous edition of this HTM (HTM 27) was published in 1978, and the introduction of these changes has led to a large expansion of information which is included in this new edition of the HTM.

1.7 While some guidance on the water services applications mentioned below is given in this memorandum, reference should be made to:

laundry	– see Health Building Note 25;
sterile supply departments	– see Health Building Note 13;
hydrotherapy pools	– see Public Health Laboratory service booklet 'Hygiene for Hydrotherapy Pools'.

HTM 2040 – 'The control of legionellae in healthcare premises – A code of practice' should be consulted for guidance on the prevention of legionnaires' disease.

Definitions

1.8 Definitions of terms are as those contained in BS6100 Sections 2.7 and 3.3, BS6700 and Model Water Byelaws.

2.0 Management responsibility

Management accountability

2.1 Management has the overall responsibility for implementating procedures to ensure that reliable hot and cold water supply, storage and distribution systems operate within the organisation.

2.2 These procedures should demonstrate that any person on whom the statutory duty falls has fully appreciated the requirement to provide an adequate supply of hot and cold water of suitable quality. Though compliance with this guidance may be delegated to staff, or undertaken by contract, accountability cannot be delegated.

2.3 Regular assessments should be made at least annually, using this guidance, to establish the extent of the risk. Shortfalls should be clearly recorded and the proposed control measures, with timescales, developed. A review should be undertaken whenever there is a substantial change in physical or environmental conditions.

2.4 The objective must be to institute management procedures to ensure that compliance is continuing and not notional. The prime purpose of the assessment is to be able to demonstrate that management has identified all the relevant factors, has instituted corrective or preventive action and is monitoring the plans being implemented.

2.5 This guidance should be applied to all healthcare premises, however small, where there is a duty of care under the Health and Safety at Work etc Act 1974.

Statutory requirements

2.6 It is the responsibility of management to ensure that their premises comply with all statutes.

2.7 Management (owners or occupiers) of healthcare premises have an overriding general duty of care under the Health and Safety at Work etc Act 1974. Therefore, they should ensure that the water supply, storage and distribution services can be provided within the terms of the following legislation.

Health and Safety at Work etc Act

2.8 Employers have a general duty, under the Health and Safety at Work etc Act 1974 to ensure, so far as is reasonably practicable, the health, safety and welfare of their patients, employees and visitors and members of the public who may be affected by workplace activities.

Northern Ireland: the Health and Safety at Work Act Order (NI)1978

2.9 These duties are legally enforceable and the Health and Safety Executive have successfully prosecuted employers including Health Authorities and Trusts under this statute. It falls upon owners and occupiers of premises to ensure that there is a management regime for the proper design, installation and maintenance of plant, equipment and systems. Failure to have a proper system of work and adequate control measures can also be an offence even though an outbreak of, for example, legionnaires' disease or other such incident has not occurred.

The Management of Health and Safety at Work Regulations 1992

2.10 These regulations require every employer to make a suitable and sufficient assessment of all risks to health and safety of employees and the public caused by work activities. In addition to legionella, other risks from a hot and cold water distribution system include deterioration of water quality, scalding at hot water outlets and danger due to bursting at excessive pressures.

Control of Substances Hazardous to Health (COSHH) Regulations 1994

Northern Ireland: Control of Substances Hazardous to Health Regulations (Northern Ireland) 1990

2.11 These regulations apply to micro-organisms, such as legionellae and to the chemicals which may be used to control the growth of micro-organisms in water supply. Employers have a duty to assess the risks from exposure to these substances to ensure that they are adequately controlled.

Public Health (Infectious Diseases) Regulations

HSG(93)56 contains further advice and guidance on communication and cooperation with the Consultant in Communicable Disease Control (CCDC), and arrangements for support of the CCDC and for him to have access to provider units, including NHS trusts

Scotland HSS(CH)1/89

Northern Ireland: Legionellosis is a notifiable disease, Public Health Notifiable Diseases Order (Northern Ireland) 1990 ST1990/66

Scotland: Legionellosis is a notifiable disease

2.12 The Public Health (Infectious Diseases) Regulations 1988 require that a properly appointed officer shall inform the chief medical officer for England or for Wales, as the case may be, of any serious outbreak of any disease which to his knowledge has occurred in his district.

Water Supply Regulations

2.13 The Water Supply (Water Quality) Regulations 1989 (as amended), apply to water supplied to any hospital which is used for domestic purposes such as drinking, washing or cooking. Two additional sources of advice on drinking water quality are:

a. the Director of Public Health;
b. the World Health Organisation 'Guidelines for drinking water quality' 1993.

2.14 The Private Water Supplies Regulations 1991 (Statutory Instrument 2790) cover private water supplies such as boreholes and wells.

Food Safety Act 1990

2.15 The Food Safety Act 1990 covers water used for food preparation or food manufacture and also includes water used for drinking.

Water and Food Production Regulations 1995 (draft) will also apply as will the Food Safety (General Food Hygiene) Regulations 1995 (draft).

Approved Code of Practice

Northern Ireland: The equivalent ACOP 'Prevention or control of legionellosis including legionnaires' disease' published by the Health and Safety for Northern Ireland – HSA62 – is in preparation

Scotland: The Public Health (Notification of Infectious Diseases) (Scotland) Regulations 1975 and 1988 with amendments

2.16 The Health and Safety Commission have published an 'Approved Code of Practice' (ACOP) and the Health and Safety Executive have produced a guidance note (HS(G)70) entitled 'The control of legionellosis including legionnaires' disease'. The onus is on management to demonstrate that procedures in place are as good as, or better than, those required by the ACOP.

2.17 Compliance with the guidance given in HTM 2040 will satisfy the ACOP requirements for the control of legionellosis.

2.18 The health service, with responsibility for the wider aspects of public health and the operation of NHS premises, is expected to be particularly vigilant. The number of outbreaks of legionnaires' disease is relatively small, but outbreaks are considered to be avoidable. Management must also acknowledge that incidents or outbreaks cause widespread concern, especially if associated with healthcare premises. Investigation of these outbreaks has shown that they are generally related to a breakdown in management systems. Design flaws and defects have also been implicated as the cause of some outbreaks.

2.19 Hence, managers need to satisfy themselves by monitoring, that effective control procedures are being implemented. It is not sufficient merely to devise procedures.

Model Water Byelaws

2.20 All water undertakers responsible for water supply have a statutory duty to enforce their byelaws for the prevention of waste, undue consumption, misuse and contamination of water supplied by them.

2.21 In 1989 new model water byelaws came into effect and these are set out, along with the water industry's interpretation of these provisions, in the 'Water Supply Byelaws Guide 1989'. The WRc (Water Research Centre) operates the Evaluation and Testing Centre which provides advice on byelaws on a national basis and administers the Water Byelaws Scheme which tests and lists water fittings and materials for compliance with the byelaws. The 'Water Fittings and Materials Directory' contains information on suitable fittings and materials and is updated every six months.

Building Regulations

2.22 Part G3 of Schedule 1 of the Building Regulations 1991 provides the functional requirements for the unvented hot water storage systems.

Building Services Research and Information Association

2.23 Application Guide AG4/94 Guide to legionellosis – temperature measurements for hot and cold water services. A practical guide which sets out the main activities which are essential for compliance with the HS(G)70 guidance on water temperatures. Its principle on planning, measurement and site procedure are equally applicable to healthcare premises.

British Standards

2.24 BS6700:1987 is the British Standard specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages.

2.25 BS1710:1984 is the British Standard specification for identification of pipelines and services.

Operational management

2.26 Managers should ensure that an operational plan is in place for each site under their control. This document should comprise:

a. up-to-date drawings and descriptions of all the supply, storage and distribution systems within those premises;

b. step-by-step instructions to operate, maintain, control and shut down the water supply, storage and distribution systems within those premises;

c. a schedule of possible emergency incidents causing loss of the water supply from the water undertaker. Each item in the emergency incident schedule should include guidance on operational procedures to re-establish a stable wholesome water supply. In re-establishing the water supply, input from the infection control team and the Consultant in Communicable Disease Control may be required.

2.27 A routine of staff training should be implemented by management on the systems' basic operational procedures, and also on those system procedures required during an emergency.

2.28 Only properly trained nominated persons should be appointed by management to control the operation of emergency equipment.

Designated staff functions

Management

2.29 Management is defined as the owner, occupier, employer, general manager, chief executive or other person who is ultimately accountable for the safe operation of healthcare premises.

2.30 A person intending to fulfil any of the staff functions specified below should be able to prove that they possess sufficient skills, knowledge and experience so as to be able to perform safely the designated tasks.

Infection control officer

2.31 Infection control officer – or consultant microbiologist, if not the same person, nominated by the management to advise on monitoring infection control policy and for the maintenance of water quality.

2.32 Additionally, the policy should be acceptable to the control of infection team and any amendment to that policy must be agreed by the team.

Nominated person

2.33 A nominated person (water), possessing adequate professional knowledge and with appropriate training, should be nominated in writing by management to devise and manage the necessary procedures to ensure that the quality of water in healthcare premises is maintained. The person will be required to liaise closely with other professionals in various disciplines. In addition, the person should possess a thorough knowledge of the control of legionellae and would ideally be a chartered engineer.

2.34 This person's role, in association with the infection control officer and maintenance staff, involves:

a. advising on the potential areas of risk and identifying where systems do not comply with this guidance;

b. liaising with the water undertakers and environmental health departments and advising on the continuing procedures necessary to ensure acceptable water quality;

c. monitoring the implementation and efficacy of those procedures;

d. approving and identifying any changes to those procedures;

e. ensuring that equipment which is to be permanently connected to the water supply is properly installed;

f. ensuring that adequate operating and maintenance instructions exist and adequate records are kept.

2.35 Implementation of an effective maintenance policy must incorporate the preparation of fully detailed operating and maintenance documentation and the introduction of a logbook system. The "nominated person" should appoint a deputy to whom delegated responsibilities may be given. The deputy should act for the nominated person on all occasions when the nominated person is unavailable.

2.36 The nominated person should be fully conversant with the design principles and requirements of water systems and should be fully briefed in respect of the cause and effect of water-borne organisms, for example **Legionella pneumophila.** The appointment of an engineer as the nominated person is appropriate in that the responsibility can extend to the operation and maintenance of associated plant. It is recognised that the nominated person cannot be a specialist on all matters and must be supported by specialists in specific subjects such as water treatment and microbiology, but he/she must undertake responsibility for calling upon and co-ordinating the activities of such specialists.

Maintenance technician

2.37 A person who, in the opinion of the nominated person, has sufficient technical knowledge and the experience necessary to carry out maintenance and routine testing of the water, storage and distribution system.

Tradesperson

2.38 A person who is appointed in writing by the nominated person to carry out, under the control of the maintenance technician, work on the water, storage and distribution system.

Installer

2.39 A person or organisation responsible for the provision of the water, storage and distribution system.

Contractor

2.40 The person or organisation designated by management to be responsible for the supply and installation of hot and cold water services, and for the conduct of the installation checks and tests.

Contract supervising officer

2.41 The person authorised by the hospital authority to witness tests and checks under the terms of contract. He/she should have specialist knowledge, training and experience of hot and cold water supply, storage and mains services and HTM 2027.

Record keeping

Post-commissioning documentation for health buildings in Scotland, Scottish Hospital Technical Note 1

2.42 Management should ensure that an accurate record of all assets relating to the hot and cold water distribution systems is set up and regularly maintained. They must also ensure that records of all maintenance, inspection and testing activities are kept up-to-date and properly stored.

Water economy and energy management

2.43 Managers should ensure that water economy and energy management policies are set up and adhered to. The requirements of such policies are briefly outlined in Chapter 4.

3.0 Description of systems

3.1 The following sections give a brief description of hot and cold water distribution systems.

Source of supply

3.2 Normally, the source of water supply to a health building is by one or more service pipe connections from the mains of a water undertaker. If the quantity and rate of flow is inadequate, or if the cost of providing the service connection appears to be uneconomical, alternative sources of supply such as boreholes or wells may be investigated or other water suppliers may be contacted.

3.3 The feasibility of a private supply should be decided by comparing the capital and revenue costs with the long-term cost of water supplied from the statutory undertaker. Due consideration should be given to the long-term costs of a private supply and account should be taken of potential deterioration in water quality and/or capacity of the private supply source.

3.4 Provision should be included for alternative water supply arrangements to meet an emergency, regardless of the source or sources of supply finally adopted. Alternative arrangements would include the provision of a second service connection from the statutory water undertaker or a private supply. The water quality requirements applicable to the main supply apply also to any alternative supplies.

3.5 Physical interconnection of pipework and valves of a statutory water undertaker's supply with any private supply is normally prohibited by water byelaws in order to eliminate backflow from one supply into the other. The statutory water undertaker should be advised of the NHS need to use any private supply as well as the statutory water undertaker's supply, and advice should be sought on the limitations imposed in respect of break cisterns and interconnection thereafter.

3.6 In England and Wales all water intended for human consumption is required by legislation to comply with the quality standards laid down in the Water Supply (Water Quality) Regulations 1989 (amended). These regulations apply to water sampled at the point where the water is available for use and embrace not just drinking water but also water used for domestic purposes.

Scotland: Water Supply (Water Quality) (Scotland) Regulations 1990 (amended).

Water treatment

3.7 While potability is not normally affected by such characteristics as hardness, colour, and (within limits) smell and/or taste, a measure of treatment may be necessary to provide a more acceptable supply, for example to protect equipment from deterioration.

3.8 Treatment may also be considered necessary where the water is to be used in humidification plant, steam boilers, laundries or other heating processes.

Water storage

3.9 Water is stored in large developments like health buildings for three basic reasons:

a. to provide reserve supply during failure of the source cold water supply to the development;

b. to reduce the maximum demand on the cold water main;

c. to provide accommodation for displaced cold feed water resulting from the expansion of any water subjected to heat.

3.10 The purpose for which the storage is used can vary, but this has only a minor effect on design. The range of uses is generally covered by the following:

a. cold water for drinking, washing and cooking;

b. cold water feed to hot water services;

c. treated cold water for laundries, heating, cooling, etc when local supplies are unsuitable;

d. supplies to equipment or areas deemed to present a backflow contamination risk;

e. feed and expansion for heating service;

f. fire-fighting.

3.11 The water byelaws and BS6700 specify minimum standards for cold water storage cisterns to ensure that the stored water is retained at a potable standard suitable for domestic use.

3.12 Guidelines on the prevention of legionnaires' disease (see HTM 2040) must also be considered in relation to water storage.

3.13 In general terms, water storage should be designed such that stored water is regularly used and not allowed to stagnate. These aims would be realised by ensuring that the stored volume is no more than the volume of water used within the building on a daily basis. However, the storage capacity should be sized to cover a 12-hour interruption on the assumption that measures will be taken to minimise water usage during any prolonged disruption.

3.14 In the event of an interruption to the supply, staff should be informed of the need to economise on water use, so extending the duration of the stored supply.

3.15 Storage cisterns should be located to minimise heat gains. To restrict microbiological growth it is important that the temperature of stored water is kept as low as practical, ideally not more than 20°C.

Cold water distribution system

3.16 The design and installation of the cold water distribution system should comply with the local water undertakers' byelaws and BS6700.

3.17 The design of the pipework should ensure that there is no possibility of a cross-connection between installations conveying potable water and installations containing non-potable water or water supplied from a private source. There should be no possibility of backflow towards the source of supply from any tank, cistern or appliance, whether by gravity backflow, back-pressure backflow or backsiphonage. A schematic drawing of a hot and cold water services distribution system can be found in Figure 1.

Hot water storage and distribution

3.18 Hot water services should be designed and installed in accordance with the water byelaws and BS6700. The hot water system may be of either the vented or the unvented type.

3.19 The components of a hot and cold service system as used within hospitals are shown in Figure 1; some installations may have fewer, or additional, features or components.

3.20 A vented system usually consists of a cold water storage cistern situated above the highest outlets, which feeds a hot water storage vessel (for example a calorifier or direct-fired boiler).

3.21 An unvented system usually has the hot water storage vessel connected to the mains water supply via a pressure-reducing valve. The components of a directly-heated unvented hot water system are shown in Figure 2.

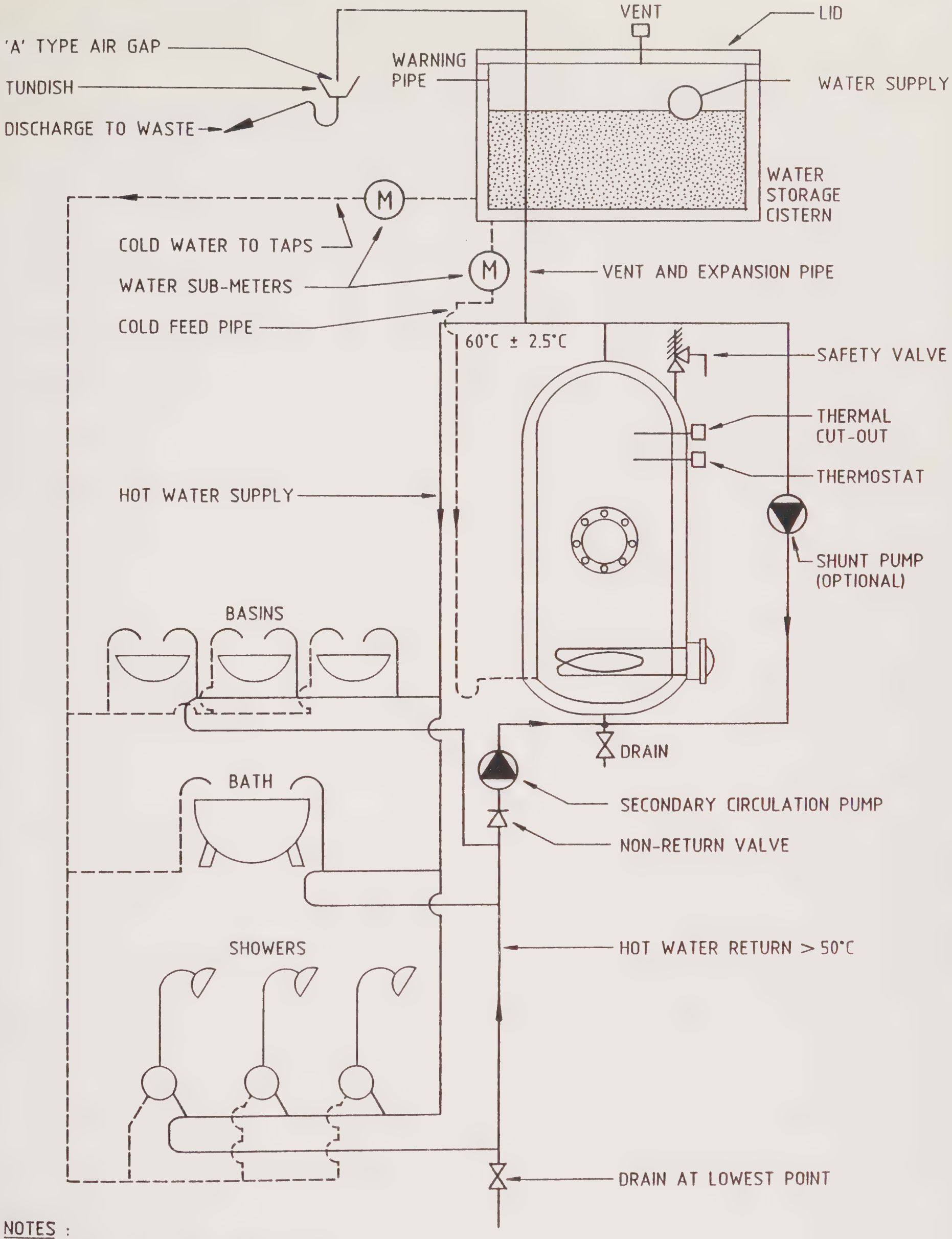
3.22 The hot water taken from the top of the storage vessel will be circulated around the building in a piped distribution system. The individual outlets, taps, mixing valves or other outlet devices will be served from the distribution system.

3.23 Particular attention is drawn to the requirement to incorporate within the design, measures to ensure the water is retained in a wholesome condition. Guidance on the control of legionellae in healthcare premises is given in HTM 2040. In order to ensure that the temperature of the water in the distribution system is within acceptable limits, a hot water secondary circulation will be required in which hot water is continuously circulated between the storage vessel and the various outlets. Alternatively, the distribution system may be electrically trace-heated to maintain the required temperature in the pipework.

3.24 Recommendations regarding safe hot water and surface temperatures, given in NHS Estates' Health Guidance Note '"Safe" hot water and surface temperatures', apply to all ward accommodation, residents' rooms and those areas to which patients, residents and visitors have free access (including public areas). Until the recommended precautions are put into effect, staff should be made aware of the potential danger and should take the necessary steps to protect patients, residents and visitors. Areas which do not meet these recommendations should be identified and plans to comply as soon as reasonably practicable should be devised.

Materials of construction

3.25 Systems should be in accordance with BS6700 and BS6920 and materials used in hot and cold water distribution should be listed in the latest edition of the Water Fittings and Materials Directory, published by the WRc.



NOTES :

1. ALL PIPEWORK TO BE INSULATED.
2. ISOLATING AND CONTROL VALVES NOT SHOWN.
3. ALL DRAINS SHOULD DISCHARGE TO WASTE VIA A TYPE 'A' AIR GAP.

SCHEMATIC HOT AND COLD SERVICES DISTRIBUTION

Figure 1

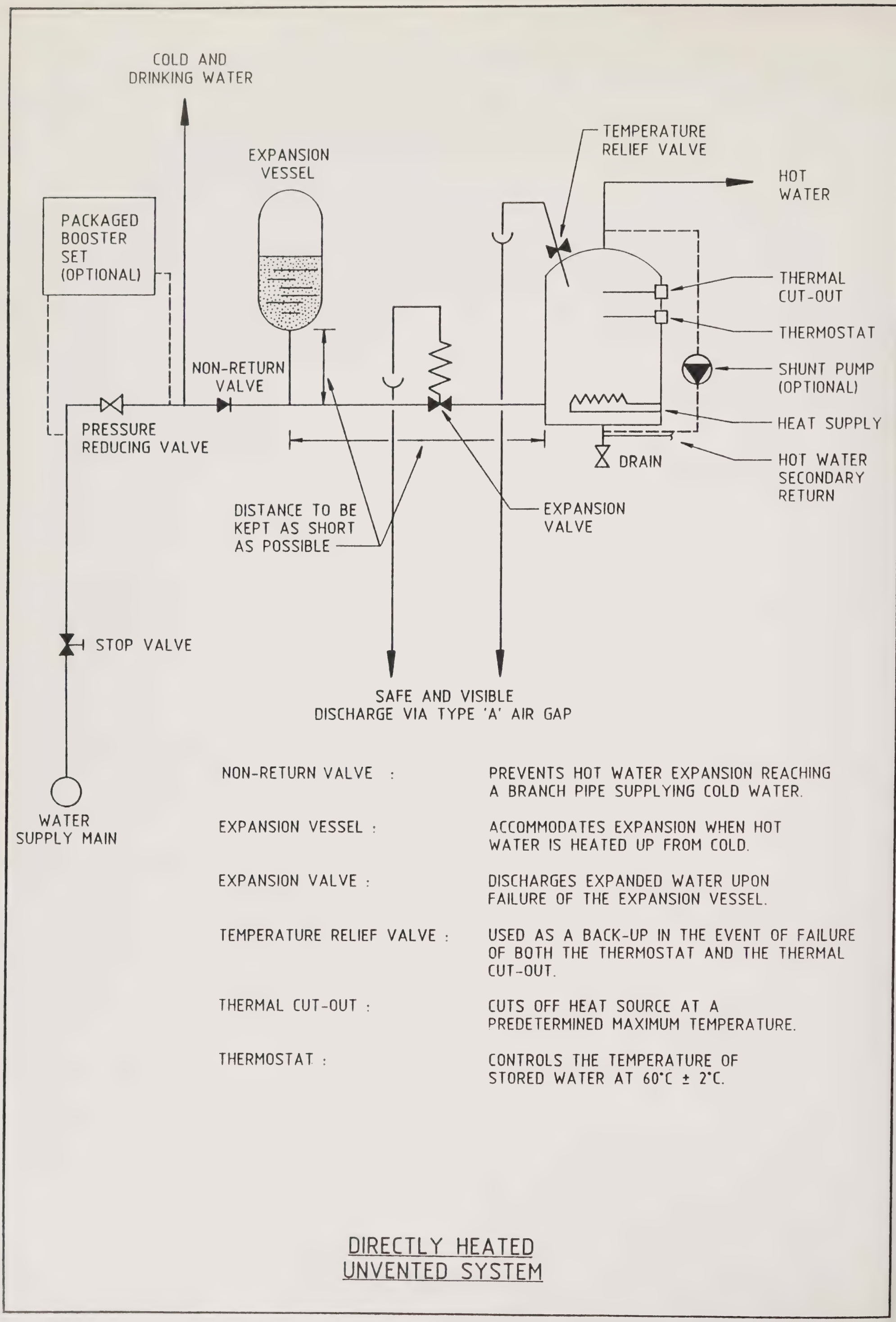

COLD AND
DRINKING WATER
EXPANSION
VESSEL
TEMPERATURE
RELIEF VALVE
HOT
WATER
PACKAGED
BOOSTER
SET
(OPTIONAL)
THERMAL
CUT-OUT
THERMOSTAT
NON-RETURN
VALVE
SHUNT PUMP
(OPTIONAL)
HEAT SUPPLY
PRESSURE
REDUCING VALVE
DRAIN
HOT WATER
SECONDARY
RETURN
DISTANCE TO BE
KEPT AS SHORT
AS POSSIBLE
EXPANSION
VALVE
STOP VALVE
SAFE AND VISIBLE
DISCHARGE VIA TYPE 'A' AIR GAP
WATER
SUPPLY MAIN
NON-RETURN VALVE : PREVENTS HOT WATER EXPANSION REACHING A BRANCH PIPE SUPPLYING COLD WATER.
EXPANSION VESSEL : ACCOMMODATES EXPANSION WHEN HOT WATER IS HEATED UP FROM COLD.
EXPANSION VALVE : DISCHARGES EXPANDED WATER UPON FAILURE OF THE EXPANSION VESSEL.
TEMPERATURE RELIEF VALVE : USED AS A BACK-UP IN THE EVENT OF FAILURE OF BOTH THE THERMOSTAT AND THE THERMAL CUT-OUT.
THERMAL CUT-OUT : CUTS OFF HEAT SOURCE AT A PREDETERMINED MAXIMUM TEMPERATURE.
THERMOSTAT : CONTROLS THE TEMPERATURE OF STORED WATER AT 60°C ± 2°C.
DIRECTLY HEATED
UNVENTED SYSTEM

Figure 2

Validation and verification

3.26 Pre-commissioning, commissioning and testing are activities that must be carried out once the hot and cold water systems have been installed or repaired, to ensure that the systems comply with the specification before handover.

3.27 Commissioning involves setting a static system into motion and adjusting the system so that it operates within specified tolerances.

3.28 Testing involves the checking of pipework, plant, equipment and controls to ensure that they operate within specified limits of temperature, pressure etc.

3.29 Further information on this subject can be found in the 'Validation and verification' volume of this document.

Operational management

3.30 Operating staff need to be provided with the necessary operation and maintenance manuals and record drawings for any new or refurbished hot and cold water systems, clearly identifying what actions must be carried out to ensure that the system will operate as intended throughout its working life.

3.31 Operation and maintenance manuals should be produced in accordance with established guidelines.

3.32 Further information on this subject can be found in the 'Operational management' volume of this document.

4.0 Management action

General

4.1 The water storage, supply and distribution service should be periodically re-assessed by management and improved where necessary to ensure that it maintains an adequate water supply to the healthcare premises facilities.

4.2 Where new healthcare premises are to be built in separate phases, the water storage, supply and distribution service for the whole premises should as far as possible be planned and evaluated at the design stage. This will enable the total water supply requirement to be assessed in the planning stages, and appropriate areas of accommodation to be allocated.

4.3 Within this general guideline, the aim should be to keep water services as simple as practicable.

4.4 Where existing facilities do not meet the standards recommended in this memorandum, management should carry out a risk assessment which should involve the infection control team to establish the extent and priority of action required for compliance. Action must then be taken to meet standards recommended in this memorandum.

4.5 A procedure of routine checks to ensure a potable and adequate water supply is recommended in the 'Operational management' volume of this document. Managers should ensure that tests are done even if they cause minor disruption to hospital services.

Water management policy

4.6 A water management policy should be set up to define actions which should be taken to ensure that water is used economically and wastage is minimised. Such a policy should include the recommendations of the report of the Audit Commission for local authorities and the NHS entitled 'Untapped Savings: Water Services in the NHS' and NHS Estates' 'A strategic guide to water and sewerage policy for general managers and chief executives'.

Energy management policy

4.7 An energy management policy should be set up to define actions which should be taken to minimise energy consumption. An effective maintenance plan will also contribute to minimising energy consumption. Further guidance is given in 'Encode' and 'A strategic guide to energy management for general managers and chief executives'.

Maintenance policy

4.8 Management is ultimately responsible for the provision of a wholesome water supply in the premises under its authority. An effective maintenance policy will be instrumental in achieving this end.

4.9 Regulation 6 of the Provision and Use of Work Equipment Regulations 1992 requires that every employer shall ensure that work equipment is maintained in an efficient state, in efficient working order and in good repair. The employer's COSHH assessment should have identified maintenance, examination and control measures to reduce the risk from exposure to hazardous substances. Regulation 9 of COSHH requires those control measure to be implemented.

4.10 Planned maintenance can be divided into two distinct policies:

a. operate plant until failure occurs, where:

   (i) the consequences of failure will not create a safety hazard;

   (ii) the consequences of failure will not affect the business operation of the building occupants;

   (iii) the costs of repair/replacement are not excessive;

   (iv) the reaction to failure can be planned in advance;

b. preventative maintenance: this involves a series of inspections at regular intervals and monitoring operating parameters in order to avoid failure by implementing timely remedial work. Further information on this topic can be found in Technical Note TN14/92 'Decisions in Maintenance' by the Building Services Research and Information Association (BSRIA).

Maintenance responsibility

4.11 Once a maintenance policy has been decided upon, a maintenance engineer must be given the responsibility for implementing it. Maintenance responsibilities include:

- the provision of adequately trained and supervised manpower;
- clear definitions of the equipment and services to be maintained, together with the procedures to be carried out on them;
- monitoring of the quality of the work carried out to ensure that it is consistently acceptable;
- the implementation of financial control procedures.

Contract maintenance

4.12 The increasing complexity of building services equipment has resulted in a growing reliance on contractors for the provision of maintenance services. The decision to use either a contractor or direct labour must be taken in the light of local circumstances. BSRIA Application Guide 4/89 provides advice on aspects to be considered when obtaining contract maintenance.

Maintenance brief

4.13 The maintenance manager requires a brief from the management which sets out in a clear and unambiguous manner the following requirements:

a. scope of work;

b. budgeting – overall and single-item limits;

c. level of reliability;

d. response time required to correct faults;

e. criteria for quality of service;

f. reporting procedure;

g. accountability and responsibility;

h. energy-saving policy;

j. health and safety policy.

4.14 The above requirements are necessary regardless of whether the work is carried out by contractors or in-house staff.

Performance monitoring

4.15 This involves the inspection of systems and records at a frequency, and in such detail, as to enable management to form an opinion regarding compliance with the agreed criteria.

4.16 If a contractor is commissioned to carry out maintenance and in-house expertise is not available to monitor their performance, an independent professional adviser should be retained to carry out this function. Using another maintenance contractor in a monitoring role could lead to a conflict of interest.

4.17 A performance monitoring checklist follows:

a. Is the required level of service being met?

b. Is all the required plant being maintained?

c. Are environmental conditions being maintained?

d. Is maintenance carried out to the agreed standard?

e. Are proper replacement parts being used?

f. Are agreed spares being held on site?

g. Are records being correctly maintained?

h. Is the maintainer using the agreed standard and number of staff, and making the agreed number of visits?

j. Is the plant being operated to achieve optimum energy usage?

k. Are health and safety requirements complied with?

m. Are only agreed sub-contractors being employed?

n. Are the client and typical users of the building satisfied?

p. Where maintenance is on a labour-plus-parts basis, do invoices accurately reflect work carried out?

q. Are breakdowns occurring too often?

r. Is adequate consideration given to the potential environmental impact of contractors action, for example, discharge of chlorinated water, discharge of water treatment chemicals either to river or sewerage systems?

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